

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s): Michael M. Iwatake (et al.) Examiner: Anh D. Mai
Serial No.: 10/711,298 Group Art Unit: 2814
Filed: September 9, 2004 Attorney Docket No: FIS920040156
Title: DUAL SILICIDE VIA CONTACT STRUCTURE AND PROCESS

AMENDMENT AND RESPONSE

Mail Stop Non-Fee Amendment
Assistant Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

This paper is submitted in response to a Final Office Action mailed April 13, 2006 by the United States Patent and Trademark Office in connection with the above-identified Application. A response to this April 13, 2006 Final Office Action is due by July 13, 2006. Therefore, this paper is being timely filed.

Amendments to the Specification begin on page 2 of this paper; and

Remarks begin on page 3 of this paper.

Amendments to the Specification

Please amend the title of this application to read as follows:

-- ~~DUAL SILICIDE VIA CONTACT STRUCTURE~~ HAVING DUAL SILICIDE
LAYERS AND PROCESS --

REMARKS

The present Amendment and Response is intended to be fully responsive to all points of objections and/or rejections raised by the Examiner and is believed to place the application in condition for allowance. Favorable reconsideration and allowance of the application are respectfully requested.

Applicants assert that the present invention is new, non-obvious and useful. Prompt reconsideration and allowance of the claims are respectfully requested.

Status of the Claims

Claims 1-10 are pending in the application.

Telephonic Interview

Applicants would like to thank the Examiner for granting a telephonic interview with Applicants' representative, Yuanmin Cai (Reg. # 56513), on May 24, 2006 to discuss the present application. Applicants presented arguments with regard to 35 U.S.C. §102(b) rejection of claim 1 and 35 U.S.C. §112, second paragraph, rejections of claims 4 and 5. During the interview, Applicants explained the above claims trying to reach common understandings on patentability of the claims with the Examiner. Meanwhile, the Examiner insisted that Applicants summarize their arguments in a response after final and only then the Examiner will provide responses in an advisory action (if necessary and assuming a response after final is filed within two-month period from the date the Final Office Action was issued).

Remarks to Specification

In the Final Office Action, the Examiner objected to the title of the invention for being not descriptive.

Applicants have amended the title of the invention to read as "VIA CONTACT STRUCTURE HAVING DUAL SILICIDE LAYERS". Applicants respectfully submit that the amended title is fully descriptive of the present invention.

Remarks to Claim Rejections

Without conceding any appropriateness of the finality of this Final Office Action because Applicants believe that the substance of the claims of record was not changed in a previous response to Office Action (although some claims were slightly amended for clarity and editorial purpose) and the Examiner is citing new reference(s) to make the rejections of claims final, Applicants respectfully submit the following remarks towards the Examiner's claim rejections.

Claim Rejections - 35 USC §112

In the Final Office Action, the Examiner rejected claims 4 and 5 under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter. In particular, the Examiner alleges that the first metal is a silicide and the sidewall portion of the second metal is a metal and therefore they are not the same. The Examiner also alleges that since the first metal and the bottom portion of the second metal are silicide, they do not consist of essentially cobalt or titanium.

Applicants respectfully disagree with the Examiner's rejection.

Claims 4 and 5 depend indirectly from independent claim 1, which recites a first layer consisting essentially of "a silicide of a first metal" and a second layer including "a second metal" and "a silicide of said second metal". Claim 4 recites that the first metal (which forms the silicide of the first layer) and the second metal (which forms a sidewall portion and the silicide of a bottom portion of the second layer) are the same. Claim 5 recites that the first metal (which forms the silicide of the first layer) consists essentially of cobalt, and the second metal (which forms the sidewall portion and the silicide of the bottom portion of the second layer) consists essentially of titanium. Therefore, Applicants respectfully submit that claims 4 and 5 are definite and distinctly claim the subject matter which Applicants regard as the invention.

Commenting on the Examiner's rejections of claims 4 and 5, Applicants have difficulty identifying any possible bases that the Examiner could rely upon to make such assertion as that the first metal (forming the first layer) and the second metal (forming the second layer) are not the same. Similarly, Applicants have difficulty identifying any

possible bases that the Examiner could rely upon to make such assertion as that the first metal (forming the first layer) does not consist essentially of cobalt, and the second metal (forming the second layer) does not consist essentially of titanium.

In view of the above, Applicants request that the Examiner's rejections of claims 4 and 5 under 35 U.S.C. §112, second paragraph, be withdrawn.

Claim Rejections - 35 USC §102

In the Office Action, the Examiner rejected claims 1-5 and 8 under 35 U.S.C. §102(b), as being anticipated by Chung et al. (US Patent No. 5,094,981).

Applicants respectfully disagree with the Examiner's rejection.

Independent claim 1 claims a via contact structure that comprises, inter alia, a dielectric region "having an outer surface and an opening extending from said outer surface through said first layer to said top surface of said substrate", and a second layer "lining said opening and contacting said top surface in said opening". Applicants respectfully submit that prior art reference Chung et al. does not teach, suggest, or even imply the above distinctive elements of claim 1.

In the Office Action, the Examiner alleges that prior art reference Chung et al. describes a via contact structure having a first layer (42c) and a dielectric region (32) that has an outer surface and an opening extending from the outer surface of the electric region (32) (FIG. 2d of Chung et al. as suggested by the Examiner). However, the Examiner failed to show that the opening of the dielectric region (dielectric region 32 according to the Examiner) extending from said outer surface through said first layer (layer 42c according to the Examiner) to said top surface of said substrate (substrate 10 according to the Examiner), as specifically required by independent claim 1.

In the Office Action, the Examiner also alleges that prior art reference Chung et al. describes a second layer lining the opening and contacting the top surface in the opening. Applicants respectfully disagree. Because the opening of dielectric region (32), as alleged by the Examiner, does not extend through layer (42c) to the top surface of substrate (10), as is clearly shown in FIG. 2d, it is physically impossible for liner (34) to be in contact with top surface of substrate (10) in the opening of dielectric region (32). A

second layer “lining said opening and contacting said top surface in said opening” is specifically required by independent claim 1.

In the Office Action, the Examiner alleges that the expression of “an opening extending from said outer surface through said first layer to said top surface of said substrate” is a product by process limitation and therefore is given no patentable weight.

Applicants respectfully disagree with the Examiner’s contention.

The expression of “extending from said outer surface through said first layer to said top surface of said substrate” describes the structure of an opening, which is clearly a structural limitation of the claimed invention. Applicants find it difficult to identify any possible bases that may support, even remotely, the Examiner’s allegation that the above expression is a product by process limitation and not a structural limitation. In the mean time, the Examiner didn’t provide either any explanation as to why the above quoted expression is not a structural limitation of claim 1 (and therefore is given no patentable weight).

In view of the above remarks, and based on requirements set forth by MPEP 2131 that a claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference, Applicants respectfully submit that claim 1 of present invention is not anticipated under 35 U.S.C. §102(b) by prior art reference of record, in particular by Chung et al., and is patentable.

Claims 2-5 and 8 depend directly or indirectly from claim 1, and thus include all the distinct elements of claim 1 in addition to other distinctive features and elements. Therefore, claims 2-5 and 8 are patentable at least for the reasons as described above with regard to claim 1.

In view of above, Applicants respectfully request that the Examiner’s rejections of claims 1-5 and 8 under 35 U.S.C. §102(b) be withdrawn.

Claim Rejections - 35 USC §103

In the Office Action, the Examiner rejected claims 6, 7, 9 and 10 under 35 U.S.C. §103(a), as being unpatentable over Chung et al. in view of Ohsaki (JP. Patent No. 08-107087).

Applicants respectfully disagree with the Examiner's rejection.

Claims 6, 7, 9 and 10 depend directly or indirectly from independent claim 1, and include all the distinct elements of claim 1 in addition to other distinctive features and elements. Therefore, claims 6, 7, 9 and 10 are patentable at least for the reasons as described above with regard to claim 1.

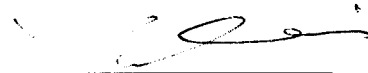
In view of above, Applicants respectfully request that the Examiner's rejections of claims 6, 7, 9 and 10 under 35 U.S.C. §103(a) be withdrawn.

Conclusion

In view of the preceding remarks, Applicants respectfully submit that all pending claims are now in condition for allowance. Favorable reconsideration and allowance of the claims are respectfully requested.

No fees are believed to be due in connection with this paper. However, if there is any such fee due, please charge any such fee to the deposit account No. 09-0458.

Respectfully submitted,




Yuanmin Cai
Agent for Applicants
Registration No. 56513

Dated: May 30, 2006

INTERNATIONAL BUSINESS MACHINE CORPORATION

Intellectual Property Law Department, East Fishkill
2070 Route 52, Bldg-321, Zip-482
Hopewell Junction, NY 12533
Tel: (845) 894-8469
Fax: (845) 892-6363

AMENDMENT TRANSMITTAL LETTER (Large Entity)					Docket No. FIS920040156	
Applicant(s): Michael M. Iwatake (et al.)						
Application No. 10/711,298	Filing Date September 9, 2004	Examiner Anh D. Mai	Customer No. 32074	Group Art Unit 2814	Confirmation No. 5297	
Invention: DUAL SILICIDE VIA CONTACT STRUCTURE AND PROCESS						
<u>COMMISSIONER FOR PATENTS:</u>						
Transmitted herewith is an amendment in the above-identified application.						
The fee has been calculated and is transmitted as shown below.						
CLAIMS AS AMENDED						
	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST # PREV. PAID FOR	NUMBER EXTRA CLAIMS PRESENT	RATE	ADDITIONAL FEE	
TOTAL CLAIMS	10 -	20 =	0	x \$50.00	\$0.00	
INDEP. CLAIMS	1 -	3 =	0	x \$200.00	\$0.00	
Multiple Dependent Claims (check if applicable) <input type="checkbox"/>					\$0.00	
TOTAL ADDITIONAL FEE FOR THIS AMENDMENT					\$0.00	
<input checked="" type="checkbox"/> No additional fee is required for amendment. <input type="checkbox"/> Please charge Deposit Account No. _____ in the amount of _____ <input type="checkbox"/> A check in the amount of _____ to cover the filing fee is enclosed. <input checked="" type="checkbox"/> The Director is hereby authorized to charge payment of the following fees associated with this communication or credit any overpayment to Deposit Account 09-0458 <input checked="" type="checkbox"/> Any additional filing fees required under 37 C.F.R. 1.16. <input checked="" type="checkbox"/> Any patent application processing fees under 37 CFR 1.17. <input type="checkbox"/> Payment by credit card. Form PTO-2038.						
WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.						
 _____ <i>Signature</i>			Dated: May 30, 2006			
Yuanmin Cai Reg. No.: 56,513 Telephone No.: 845-894-8469			<div style="border: 1px solid black; padding: 5px;"> I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to "Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450" [37 CFR 1.8(a)] on _____ _____ (Date) </div> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> _____ <i>Signature of Person Mailing Correspondence</i> </div> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> _____ <i>Typed or Printed Name of Person Mailing Correspondence</i> </div>			
CC:						